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APPL NO.	FILING OR 371 (c) DATE	ART UNIT	FIL FEE RECD	ATTY. DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
10/535,145	12/28/2005	3662	1440	29637	12	47	7

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CONFIRMATION NO. 2400

## FILING RECEIPT



\*OC000000018497376\*

Date Mailed: 04/11/2006

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

## Applicant(s)

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## Power of Attorney:

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## Domestic Priority data as claimed by applicant

This application is a 371 of PCT/IL03/00971 11/17/2003  
which claims benefit of 60/428,280 11/22/2002

## Foreign Applications

Projected Publication Date: 07/20/2006

Non-Publication Request: No

Early Publication Request: No

\*\* SMALL ENTITY \*\*

**Title**

Smart antenna system with improved localization of polarized sources  
with

**Preliminary Class**

342

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Docket No.  
**29637****Declaration and Power of Attorney For Patent Application****English Language Declaration**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**SMART ANTENNA SYSTEM WITH IMPROVED LOCALIZATION OF POLARIZED SOURCES**

the specification of which



Is attached hereto.



was filed on **17 November 2003** as ~~United States Application No.~~ or PCT

International Application Number **PCT/IL03/00971**

~~and was amended on~~ \_\_\_\_\_

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of federal Regulations, Section 1.56. Including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

\_\_\_\_\_  
(Number)

\_\_\_\_\_  
(Country)

\_\_\_\_\_  
(Day/Month/Year Filed)



\_\_\_\_\_  
(Number)

\_\_\_\_\_  
(Country)

\_\_\_\_\_  
(Day/Month/Year Filed)



\_\_\_\_\_  
(Number)

\_\_\_\_\_  
(Country)

\_\_\_\_\_  
(Day/Month/Year Filed)



I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

60/428,280  
(Application Serial No.)

22 November 2002  
(Filing Date)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

I hereby claim the benefit under 35 U.S.C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112. I acknowledge the duty to disclose to the United States Patent and Trademark Office all the information known to me to be material to patentability as defined in Title 37, C.F.R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PCT/IL03/00971  
(Application Serial No.)

17 November 2003  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

\_\_\_\_\_  
(Application Serial No.)

\_\_\_\_\_  
(Filing Date)

\_\_\_\_\_  
(Status)  
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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## **Application Data Sheet**



### **Application Information**

Application number::	Not Yet Assigned
Filing Date::	Herewith
Application Type::	Regular
Subject Matter::	Utility
CD-ROM or CD-R?::	None
Title::	Smart Antenna System With Improved Localization Of Polarized Sources
Attorney Docket Number::	29637
Request for Early Publication?::	No
Request for Non-Publication?::	No
Suggested Drawing Figure::	7
Total Drawing Sheets::	12
Small Entity?::	Yes
Petition included?::	No
Secrecy Order in Parent Appl.?::	No



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Representative Designation::	Registration Number::	Representative Name::
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## Domestic Priority Information

<b>Application::</b>	<b>Continuity Type::</b>	<b>Parent Application::</b>	<b>Parent Filing Date::</b>
This application	National Stage of	PCT/IL03/00971	11/17/03
This application	An application claiming the benefit under 35 USC 119(e)	60/428,280	11/22/02

[This application has no foreign priority claims]



# SMART ANTENNA SYSTEM WITH IMPROVED LOCALIZATION OF POLARIZED SOURCES

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## FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to a smart antenna method and apparatus and, more particularly, but not exclusively to the use of polarization as an additional parameter for determining the angle of arrival of impinging electromagnetic radiation.

10 Vector sensors enable estimation of the angle of arrival and polarization of impinging electromagnetic waves with arbitrary polarization. In the last decade, many array processing techniques for source localization and polarization estimation using vector sensors have been developed. A. Nehorai and E. Paldi, "Vector-sensor array processing for electromagnetic source localization," IEEE Trans. on Signal  
15 Processing, vol. 42, pp. 376-398, Feb. 1994, the contents of which are hereby incorporated by reference, developed the Cramer-Rao bound (CRB) and the vector cross-product direction-of-arrival (DOA) estimator. Polarimetric modeling using vector sensors is performed in B. Hochwald and A. Nehorai, "Polarimetric modeling and parameter estimation with application to remote sensing" IEEE Trans. On Signal  
20 Processing, Vol. 43 pp. 1923-1935, Aug 1995 the contents of which are hereby incorporated by reference.

Identifiability and uniqueness issues associated with vector sensors are analyzed in G. F. Hatke, 27<sup>th</sup> Asilomar Conf. 1993, pp 1365-1369, K. C. Ho, K.C. Tan, W. Ser, Signal Processing Vol. 47 pp 41-54 Nov. 1995, B. Hochwald and A  
25 Nehorai, IEEE Trans on Signal Processing, Vol. 44 No. 1 pp 83-95 Jan 1996, K. C. Tan, K.C. Ho, A. Nehorai IEEE Trans. Signal Processing, Vol. 44 pp. 3099-3107, Dec. 1996. The contents of each of the above documents are hereby incorporated by reference.

Eigenstructure-based techniques, such as ESPRIT and multiple signal  
30 classification (MUSIC) for source localization using vector sensors have been extensively investigated. J. Li, IEEE Trans. Antenna Propagation. Vol. 41. pp 379-387 March 1993, the contents of which are hereby incorporated by reference, applied the ESPRIT algorithm to a vector sensor array. ESPRIT-based direction finding algorithms using vector sensors have been further investigated in several papers